Maternal Deaths in California, 1957-1962

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• **During the period 1957-1962, the Committee on Maternal and Child Care of the California Medical Association and the State Department of Public Health studied 551 deaths of women who died during or within 90 days of termination of pregnancy. Of the 356 deaths from obstetric causes, 109 were attributed to abortion. Of the 195 deaths from non-obstetric causes, about one-half were considered by review committees to have been related to pregnancy.**

CONTINUING STUDIES are being carried forward by the Committee on Maternal and Child Care of the California Medical Association and the State Department of Public Health with a view to identifying shortcomings in maternal care which, if rectified, can reduce the maternal mortality rate.

The following case illustrates the kind of problems encountered and provided a background for some of the Committee's recommendations:

Although the patient had been informed during her first pregnancy that she was diabetic, she did not consult her physician until the 12th week of her second pregnancy. She had been most casual about her insulin treatment and had not seen the physician in the eight months previous. At this first prenatal visit she had a 3+ reaction for sugar in the urine and 1+ albuminuria. However, she was not seen again for another six weeks; her visits then assumed a more regular pattern.

She went into spontaneous labor at 43 weeks and progressed rapidly to complete dilatation. Nitrous oxide-oxygen was first given, and then a pudendal block was done. In 15 minutes there was a convulsive seizure. Oxygen was given by the nurse and an anesthesiologist summoned. On his arrival five minutes after the convulsion, the patient was apparently dead. Pure oxygen was given without effect nor did thoracotomy and cardiac massage change the situation. A living child was delivered by low forceps and survived after ten minutes resuscitation. Cause of death on the death certificate was eclampsia.*

A regional committee of the Committee on Maternal and Child Care of the California Medical Association and the State Department of Public Health reviewed the foregoing case as a part of its study of maternal mortality. The members identified a series of patient and professional errors which contributed to the death of the mother:

1. The patient did not avail herself of medical supervision early in pregnancy, despite her knowledge of a complicating illness.

2. The physician did not follow up when the patient did not appear on schedule for prenatal care after her first visit.

3. No electrolyte studies were done although an imbalance was probable because of drugs administered.

4. An anesthesiologist was not on hand for the delivery. The choice of nitrous oxide was a poor one.

The patient was one of the more than one hundred women who die in California each year from conditions associated with pregnancy, delivery and the puerperium: Three mothers for every 10,000 live births.

The present death rate from obstetric causes represents a remarkable achievement of recent years, an improvement even greater than for mortality rates of infants around the time of birth:

DEATHS PER 10,000 LIVE BIRTHS

Year	*Obstetric Causes*	*Fetal (20 or more weeks gestation)*	*Neonatal (deaths under 28 days after birth)*
1920	70	306	362
1940	28	204	254
1960	3	129	172

However, despite this improvement, California's death rate from obstetric causes was higher than that in 21 other states for the period 1958-1960; New England, the West North Central states, Oregon, Washington and Hawaii had lower rates.[4]

In an effort to reduce deaths even more, since 1957 the Committee on Maternal and Child Care has been investigating all known deaths of women

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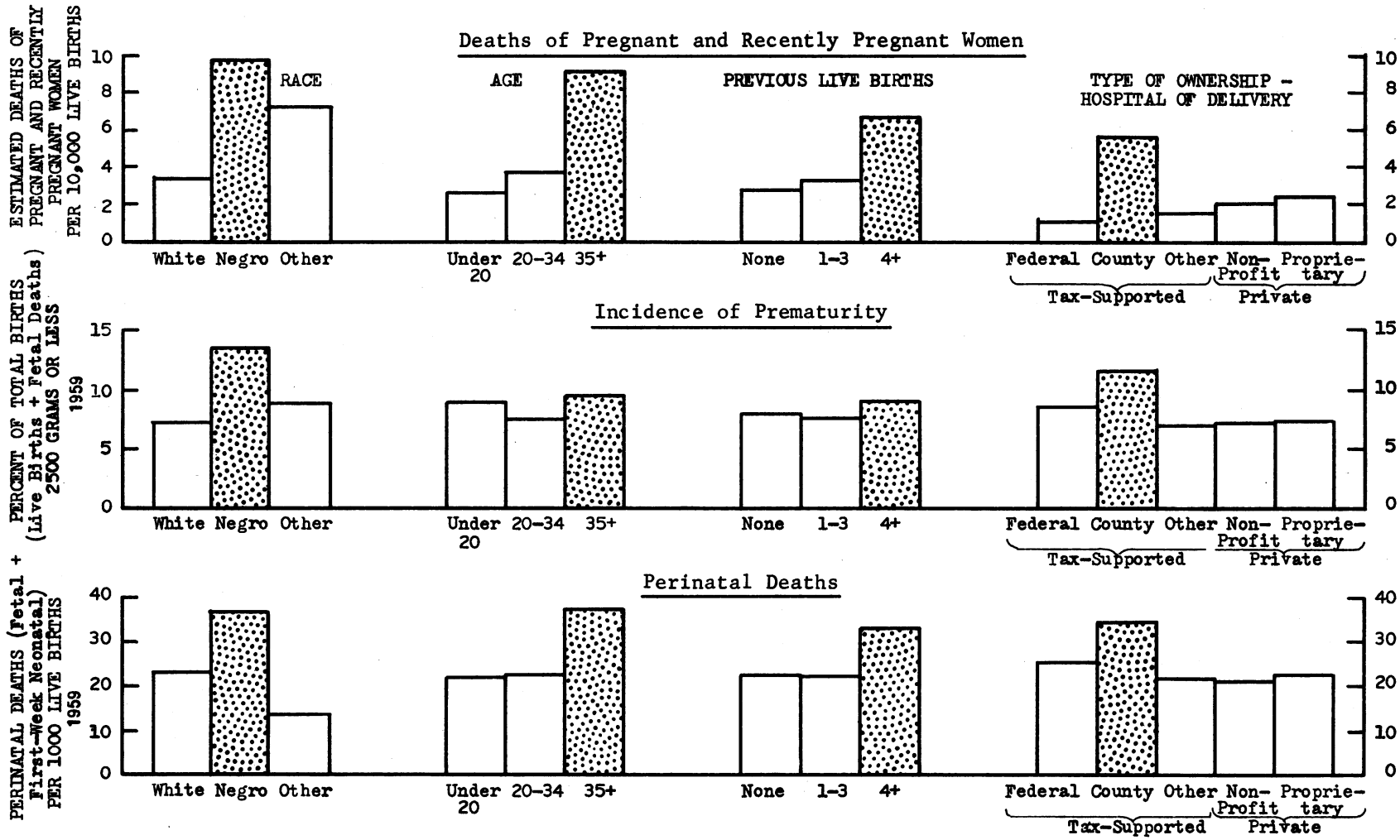
*The foregoing was adapted from the committee records; the death was one of those discussed in the present report.

Chart 1.—Estimated* Death Rate Among Pregnant and Recently Pregnant Women—Incidence of Prematurity and Perinatal Death Rate; Data on Race, Age, Previous Live Births and Hospital of Delivery.



* Death from any cause during or within 90 days after termination of pregnancy. Estimated from 1959-1961 data.

Group with highest rate

during or within 90 days after termination of pregnancy, including deaths from both obstetric and non-obstetric causes. Obstetricians in private practice, either board-certified or board-eligible, have been appointed as special consultants to the State Department of Public Health in order to review hospital, coroner and other records and, when possible, to interview attending physicians. Consultants' case summaries are discussed in five regional review committees composed of obstetricians, pathologists, anesthesiologists, general practitioners and public health physicians. Committees study causes of maternal death and avoidable factors for statistical and educational purposes, and to evaluate local practices and facilities. (For a more detailed description of the Committee's organization and activities, see "Maternal and Perinatal Deaths in California," CALIFORNIA MEDICINE, 93:302-305, 1960.)

STUDY METHODS AND LIMITATIONS

Study cases were found primarily through (1) death certificates with an obstetric cause of death (International Classification of Diseases categories 640-689), (2) a cross-check by some local health departments of all deaths of women ages 15-44 against birth records to find non-obstetric deaths of recently pregnant women, (3) study of deaths from non-obstetric causes for which pregnancy was mentioned on the death certificate, and occasionally (4) personal knowledge of committee members. An unknown number of deaths of pregnant and recently pregnant women from non-obstetric causes were not identified; for example, in those areas without a cross-check of deaths and births, at least 25 per cent of deaths within the scope of the study were missed.[3] Case-finding methods in California are similar to those used in several other states investigating maternal deaths.[2]

The present report summarizes statistical information for 551 deaths for which certificates were filed during the five years August 1, 1957-July 31, 1962; investigations for an additional 228 reported deaths were not completed in time for inclusion. The two groups of women—those studied and those not yet studied—were similar with regard to race, age, previous live births, type of hospital ownership where they delivered, and proportions of deaths from abortion, other obstetric causes and non-obstetric causes.

Review was started of 31 deaths which were later excluded from the study. In 22 cases, the women either were not pregnant at the time of death or more than 90 days had elapsed since pregnancy. Eight cases were involved in litigation and were not reviewed. Cooperation with the study has been very good; only one case was excluded because the review committee was unable to obtain sufficient facts to evaluate the death.

Coroner and other records available to consultants varied in completeness. Since the identification of complications and avoidable factors is necessarily subjective with each observer, review committee members sometimes disagreed among themselves or with the original attendant about the existence or classification of factors.

The primary purpose of these studies is education, rather than basic research. No attempt has been made at this time to analyze the clinical data recorded in case summaries, although a large series of cases is being collected as a starting point for study of specific problems.

HIGH-RISK GROUPS IN THE POPULATION

The actual risk of death among pregnant and recently pregnant women is not known for the general population, since the incidence of pregnancy is unknown. (Official birth records are limited to live births and, in California, to fetal death of 20 weeks or more gestation.) However, in order to identify problem groups in the population, the estimated number of maternal deaths studied per 10,000 live births has been compared in Chart 1 with prematurity and perinatal death rates by race, age of mother, previous live births and ownership of hospital of delivery.

Since infant loss is a reflection of maternal morbidity, it was not surprising to find the same groups of women with the highest maternal death rates also produced infants with high prematurity and perinatal death rates: Negroes, mothers of age 35 or over, those with four or more previous live births, and county hospital clients.

CAUSES OF DEATH

From the investigator's summary, review committees assigned a single underlying cause of death among pregnant and recently pregnant women, defined as "the disease or injury which initiated the train of events leading directly to death." The choice of this statistical cause of death was necessarily arbitrary for some cases, and review committees assigned about one-third (186) of the deaths to a different International Classification category from the one selected by the physician who completed the original death certificate.

Table 1 shows causes of death selected by review committees. The 551 deaths studied were divided into three groups for discussion in this report: Abortion deaths, deaths from other obstetrical causes, and non-obstetric deaths.

TABLE 1.—*Causes of Maternal Death Assigned by Review Committee*

International Classification Category	Cause of Death	Number	Per Cent	Number With Pregnancy Responsible for Death*
	All Deaths Studied	551	100.0	450
640-689	Total obstetric deaths	356	64.6	356
650-652	Abortion	109	19.8	109
650, 652	Without sepsis	35	6.4	35
651	With sepsis	74	13.4	74
	Other obstetric cause	247	44.8	247
604-1, 681-2, 684	Sepsis (excluding abortion)	52	9.4	52
643-4, 670-2	Hemorrhage	39	7.1	39
642, 685-6	Toxemia	35	6.4	35
645	Ectopic pregnancy	28	5.1	28
646-649	Other complications of pregnancy	25	4.5	25
676-7	Trauma of delivery	25	4.5	25
673-5, 660, 678	Other complications of labor or delivery	29	5.3	29
680, 687-8, 683	Other complications of puerperium	14	2.5	14
Exclusive of 640-689	Total non-obstetric deaths	195	35.4	94
750-9	Congenital malformations	12	2.2	8
140-239	Neoplasms	19	3.4	2
	Diseases and conditions of:			
330-398	Nervous system and sense organs	15	2.7	3
400-468	Circulatory system	28	5.1	18
470-527	Respiratory system	28	5.1	20
530-587	Digestive system	11	2.0	5
240-289	Allergies, endocrine, metabolic and nutritional disease	10	1.8	3
E800-999	Accidents, poisonings and violence:			
E800-965	Accidents	33	6.0	15
E970-979	Suicides	6	1.1	1
E980-985	Homicides	4	0.7	....
Exclusive of above	All other causes	29†	5.3	19

*By definition, review committees considered deaths from obstetric causes to have been caused by pregnancy. However, obstetric deaths include two fatalities from liver disease arising during pregnancy in which committees could not determine whether deaths were actually related to pregnancy. For deaths from non-obstetric causes, a determination was made whether death was "hastened or made more likely" by pregnancy.

†Fewer than ten deaths in any category.

DEATHS FROM ABORTION

The medical term *abortion* designates the termination of a pregnancy at any time before the fetus has attained a state of viability. In general, review committees considered deaths from abortion as those associated with termination of pregnancy of less than 28 weeks (other than ectopic pregnancy); however, included with the 109 abortion deaths were three deaths from induced abortion of 28 weeks or more.

Three types of abortion are distinguished: unintentional or spontaneous; therapeutic, to save the life of a pregnant woman; and illegal or criminal. About one-fourth of all pregnancies terminate in spontaneous abortion before the 28th week.[1] The origin of the abortions leading to the 109 study deaths could not always be determined by study committees; however, for study purposes 23 (21.1 per cent) were considered spontaneous or of unknown origin, one (0.9 per cent) was performed for therapeutic reasons, and 85 (78.0 per cent) were termed "induced."

Almost one-third of all study deaths from obstetric causes resulted from abortion. This has become an increasingly important cause of maternal death in recent years: As death rates from other obstetric causes have declined, death rates from abortion have remained the same for whites and increased slightly for nonwhites. Using live births for comparison, nonwhites and mothers with several previous children have significantly higher death rates from abortion:

Population Group	*Estimated Number of Deaths From Abortion Per 10,000 Live Births (1959-1961 Data)*
Total	0.9
Race	
White	0.8
Nonwhite	1.8
Age	
Under 20	0.4
20-34	0.9
35 and over	1.5
Previous Live Births	
None	0.4
1-3	0.6
4 and over	1.9

TABLE 2.—*Weeks of Pregnancy and Time of Maternal Death—Deaths from Obstetric Causes (Except Abortion) and from Non-Obstetric Causes**

Weeks of Pregnancy and Time of Death	Deaths from Obstetric Causes (Except Abortion)		Deaths from Non-Obstetric Causes	
	Number	Per Cent	Number	Per Cent
All Deaths Studied	247	100.0	195	100.0
Weeks of Pregnancy at Delivery or Death	224†	100.0†	172†	100.0†
Under 28 weeks	33	14.7	57	33.1
28-36 weeks	40	17.9	54	31.4
37 weeks and over	151	67.4	61	35.5
Time of Maternal Death	247	100.0	195	100.0
Mother delivered	209	84.6	125	64.1
Died during delivery	6	2.4	3	1.5
Died after delivery	196	79.4	111	56.9
Under one day	115	46.6	44	22.5
1-6 days	36	14.6	31	15.9
7 or more days	44	17.8	36	18.5
Days not reported	1	0.4	....	....
Delivered postmortem	6	2.4	11	5.6
Time not reported	1	0.4	....	....
Mother undelivered	38	15.4	70	36.0
Died before onset of labor	28	11.3	67	34.5
Died during labor	10	4.0	2	1.0
Time of death not reported	....	....	1	0.5

*Note: Excludes 109 abortion deaths.
†Excludes deaths without weeks of pregnancy reported.

However, comparisons of the incidence of induced abortion among groups of women is not possible since it is not known how many women attempt or seek abortion and survive.

Two-thirds of the 109 women were married; occupations most frequently reported were housewife (40.4 per cent), clerical or sales (27.5 per cent) and semi-skilled or unskilled labor (23.8 per cent).

In only 15 cases was there a record of any medical attention for pregnancy, even for confirmation of pregnancy. (Four women who mistakenly assumed they were pregnant and died from attempted abortion were excluded from the study.) In 78 of the cases, there was expulsion or mechanical removal of the products of conception; the other 31 women died without expulsion or removal of the products. Two-thirds of the 109 women died in a hospital. Of the 56 women for whom date of abortion was known, 38 died within one week and 18 a week or more later.

The patient admitted or was described as attempting the abortion herself in one-third of the deaths; for almost all others it was impossible to determine who, if anyone, was responsible. Methods of induction were widely varied: Intrauterine injections of soap or of peroxide; insertion of coat hangers, knitting needle or welding wire; insertion of air by catheter or by a plastic straw, using a football pump; douches of lysol, soap or potassium permanganate; ingestion of ergotrate, turpentine, magnesium sulfate, castor oil, or of a potassium compound.

DEATHS FROM OBSTETRIC CAUSES OTHER THAN ABORTION

Causes of Death

Excluding women who died as a result of abortion, 247 out of the 551 deaths studied were from other obstetric causes (Table 1). Sepsis, even when not associated with abortion, caused one in five of the 247 obstetric deaths. Although declining in recent years as a cause of maternal death in California, hemorrhage accounted for 15.8 per cent and toxemia for 14.2 per cent. Other frequently assigned underlying causes were ectopic pregnancy (11.3 per cent); other complications arising during pregnancy (10.1 per cent); trauma of delivery (10.1 per cent); and other complications of delivery (11.7 per cent); or the puerperium (5.7 per cent).

Prenatal Care

One in five (48 out of 247) women who died of other obstetric causes had no record of prenatal care. Although 21 of the women were delivered or died very early in pregnancy, 27 had reached the 20th week without care.

Records about earlier pregnancies and complications varied in completeness. However, of the 181 women with at least one earlier pregnancy for whom investigators obtained information, 104 (57.5 per cent) had a history of one or more previous complicated pregnancies.

Time of Maternal Deaths

Two-thirds of the women for whom information was recorded had carried their pregnancies to term

TABLE 3.—*Type and Outcome of Delivery—Deaths from Obstetric Causes (Except Abortion) and from Non-Obstetric Causes*

Type and Outcome of Delivery	Deaths from Obstetric Causes (Except Abortion)		Deaths from Non-Obstetric Causes	
	Number	Per Cent	Number	Per Cent
All Deliveries	214*	100.0*	130‡	100.0‡
Type of Delivery	214*	100.0*	130‡	100.0‡
Spontaneous	70	32.7	42	32.3
Cesarean section	65†	30.4†	48§	37.0§
Other procedure mentioned	76	35.5	28	21.5
Manipulation—breech	3	1.4	2	1.5
Manipulation—version	4	1.9	1	0.8
Forceps, mid or high	10	4.7	1	0.8
Forceps, low or unspecified	44	20.5	22	16.9
Surgical, excluding episiotomy	15	7.0	2	1.5
Type of delivery not reported	3	1.4	12	9.2
Outcome of Delivery	214*	100.0*	130‡	100.0‡
Fetal death	75	35.0	40	30.8
Under 20 weeks gestation	17	7.9	11	8.5
20 weeks or more	58	27.1	29	22.3
Live birth	139	65.0	90	69.2
2500 grams or less	17	7.9	36	27.7
2501 grams or more	122	57.0	54	41.5

*Includes five sets of twins; 214 infants born to 209 mothers who delivered.
†Includes six postmortem deliveries.
‡Includes three sets of twins and one of triplets; 130 infants born to 125 mothers who delivered.
§Includes nine postmortem deliveries.

(at least 37 weeks) at the time of delivery or death (Table 2). Almost all (209 or 84.6 per cent) delivered, including six women who were delivered after death. Of the 196 women who died after delivery, 58.7 per cent died within 24 hours, 18.4 per cent between one and six days later, 22.4 per cent more than one week postpartum, or (0.5 per cent) an unknown number of days after delivery.

Type and Outcome of Delivery

Three out of ten deliveries among women who died of obstetric causes were by cesarean section, and other procedures were reported for more than three deliveries out of ten (Table 3).

Two-thirds of all deliveries were live births; of the 139 liveborn infants, 12.2 per cent weighed 2500 grams or less. Six postmortem deliveries produced three living and three dead infants.

Comparison of Women Using County and Other Types of Hospitals

Of the 247 women studied who died from obstetric causes other than abortion, 51 were known to have been delivered or to have died in county hospitals and 175 either delivered or died in other types of hospitals.

When county hospital patients were compared with patients from other hospitals, it was found that:

- Among maternal deaths, county hospital clients represented a concentration of high-risk groups. Although they accounted for one-fifth of the deaths, they included one-half of all deaths of Negroes, one-third of the women with four or more previous live births, and two-fifths of the women with late or no prenatal care.
- Toxemia was the leading cause of death among county hospital patients; it ranked fourth after complications of delivery, sepsis and hemorrhage for patients of other types of hospitals.
- Mothers among the county hospital group had stillborn infants almost twice as often as the other group of patients (58.1 per cent compared with 30.4 per cent).

DEATHS FROM NON-OBSTETRIC CAUSES

Causes of Death

The most frequent causes of non-obstetric death among 195 pregnant and recently pregnant women were circulatory disease (14.4 per cent), respiratory disease (14.4 per cent), diseases of the nervous system (7.7 per cent), and accidental or violent death (22.0 per cent); (See Table 1). Among the 33 accidental deaths were 16 resulting from medical procedures: One death was from surgical operation, three from transfusion and 12 from anesthesia. There were 13 women for whom the procedure was performed because of pregnancy or delivery.

About one-half of the 195 deaths (94) were considered by review committees to have been "hastened or made more likely" by pregnancy or labor.

TABLE 4.—*Avoidable Factors Identified by Review Committees*

Avoidable Factor	Deaths with This Factor Identified	
	Number	Per Cent
All Deaths Studied	551	100.0
PATIENT FACTORS		
Inadequate prenatal care by patient—The patient did not seek care early in pregnancy or did not seek care at all	99	18.0
Induced abortion—Any attempt to induce abortion by mother or others. Does not include therapeutic abortion	95	17.2
Patient refusal to follow medical advice	33	6.0
Example: Patient refused to be hospitalized for complications of pregnancy.		
PROFESSIONAL OR HOSPITAL FACTORS		
Professional error in judgment—The physician attending the patient made the wrong decision in care, failed to act when care was needed or failed to follow through on care	247	44.8
Example: Failure to find the source of bleeding in a peritoneal and retroperitoneal hemorrhage occurring during labor, although a cesarean section and hysterectomy were performed without a bleeding point being found. Actual cause was rupture of splenic artery.		
Example: Patient discharged from hospital with symptoms of toxemia.		
Example: In his efforts to establish respiration in the infant, the physician overlooked the extent of lacerations in the mother, which resulted in her death from hemorrhage.		
Professional error in technique—The physician had the knowledge for necessary treatment but not the skill to administer it. That is, he made the correct decision but technically erred in providing it.	48	8.7
Example: Third degree lacerations during delivery of twins weighing less than three pounds; overloading vascular system with transfused blood.		
Inadequate prenatal care by physician—The physician conducted a perfunctory examination, did not request the mother to return early or frequently enough, or whose medical management of case was inadequate	40	7.2
Inadequate hospital facilities—Deficiencies in equipment or space, nursing staff or other personnel.	33	6.0
Example: Sufficient blood not available when required.		
NO FACTOR IDENTIFIED	128	23.2
UNDETERMINED IF FACTOR EXISTED	47	8.5

Time of Maternal Death

Compared with women who died of obstetric causes, in non-obstetric deaths, pregnancy was more often terminated by delivery or death before term and before the onset of labor (see Table 2). More than one-third of the mothers did not deliver, compared with 15.4 per cent among obstetric deaths. Of the 111 women who died after delivery, 39.7 per cent died within 24 hours, 27.9 per cent from one to six days later and 32.4 per cent more than one week postpartum.

Time and Outcome of Delivery

Of the 117 women with at least one earlier pregnancy for whom information was obtained about previous pregnancies, 64 (54.7 per cent) had a history of at least one complicated pregnancy. This was similar to the proportion found among obstetric deaths.

Of 118 deaths with information about type of delivery for this pregnancy, 48 or 40.7 per cent were delivered by cesarean section, including nine postmortem deliveries (see Table 3).

Two-thirds of the 130 deliveries among women who died of non-obstetric causes were live births. This was a similar proportion of live births to that among women who died of obstetric causes; however, these 90 liveborn infants in the non-obstetric group included more prematures than infants in the obstetric group (40.0 per cent compared with 12.2 per cent). Eleven postmortem deliveries resulted in eight live births and three fetal deaths. Proportions of deaths with one or more avoidable factors varied from 96.4 per cent of all deaths from abortion to 46.7 per cent of all non-obstetric deaths studied (Chart 2). One or more factors were found in 376 (68.1 per cent) of the deaths studied.

AVOIDABLE FACTORS IDENTIFIED BY REVIEW COMMITTEES

Table 4 shows definitions, examples and the frequency with which specific types of avoidable factors were considered by committees to have contributed to the maternal death. The factors found most often were professional errors in judgment (44.8 per cent of all deaths), inadequate prenatal care by patient (18.0 per cent) and induced abortion (17.2 per cent).

Identification and classification of factors was limited by incompleteness of records and the necessarily subjective interpretations of individual physicians. An example of a type of case for which various committees differed in deciding on avoidable factors was that of women who delayed seeking pre-

Chart 2.— Percent of Deaths With Avoidable Factors Identified—Cause of Death

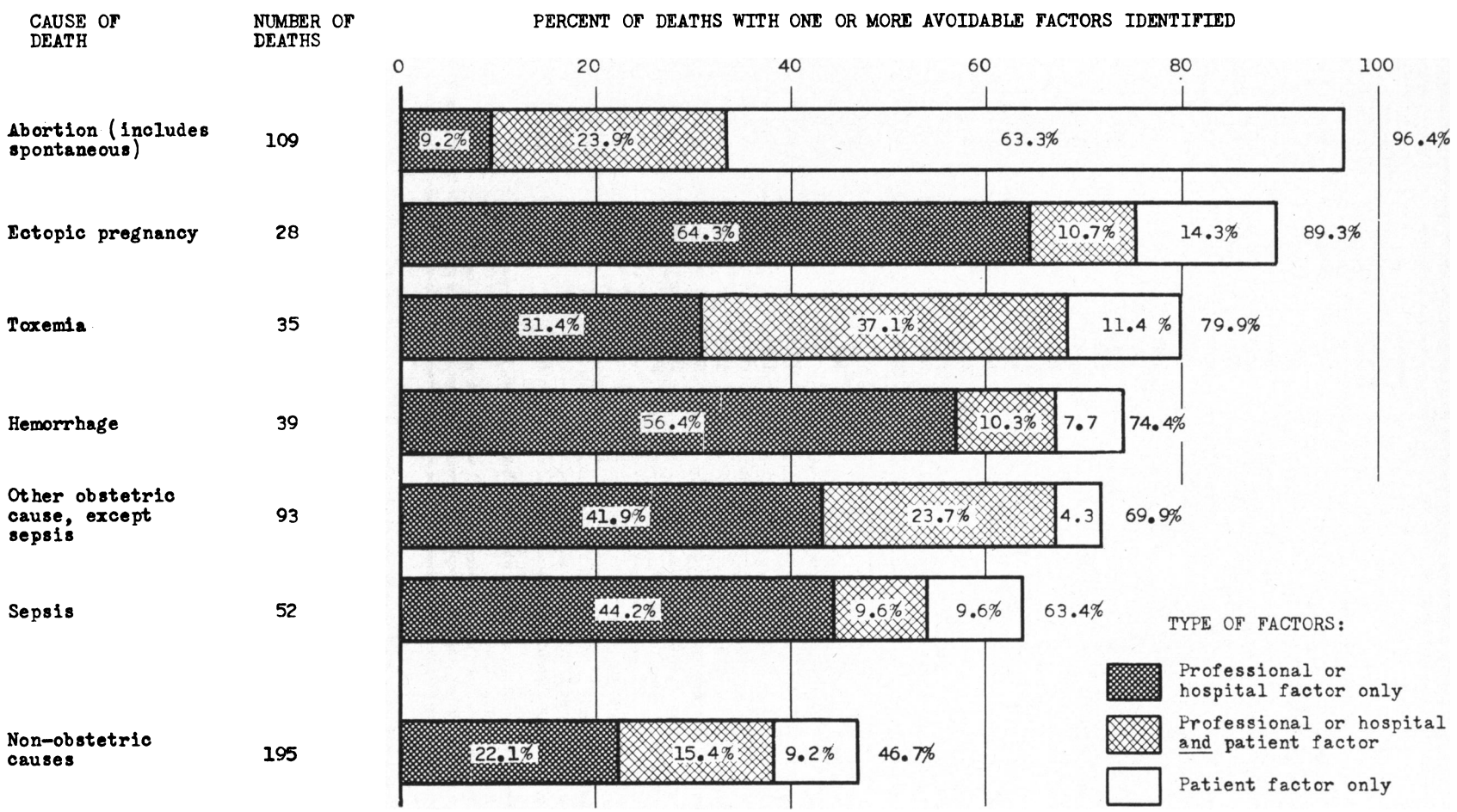


TABLE 5.—*Per Cent of Deaths With Avoidable Factors Identified—Selected Variables*

Variable	Number of Deaths Studied	Per Cent With Avoidable Factor Identified			
		Any Factor	Professional Or Hospital Factor Only	Patient Factor Only	Both Types of Factors Identified
All deaths studied	551	68.1	30.0	19.4	18.7
Race or ethnic group	551	68.1	30.0	19.4	18.7
White	408	66.2	28.2	18.9	19.1
Mexican-American*	87	75.9	34.5	16.1	25.3
Other	321	63.5	26.5	19.6	17.4
Negro	113	74.3	34.5	21.2	18.6
Oriental and other nonwhite	30	76.7	43.3	16.7	16.7
Age	551	68.1	30.0	19.4	18.7
Under 20	55	65.5	21.8	25.5	18.2
20-29	242	66.1	30.6	16.9	18.6
30-39	219	71.7	31.1	21.0	19.6
40 and over	35	68.5	37.1	14.3	17.1
Previous live births	492‡	70.7	32.7	17.9	20.1
None	114	69.3	31.6	17.5	20.2
1-3	241	67.2	33.2	14.5	19.5
4 and over	137	77.3	32.1	24.8	20.4
Source of prenatal care	338‡	63.1	40.0	5.9	17.2
Private physician	272	63.2	40.1	6.6	16.5
Public or private hospital clinic	66	62.1	39.4	3.0	19.7
Hospital of delivery	351§	67.9	38.5	10.0	19.4
County	88	78.4	31.8	19.3	27.3
Other tax-supported†	40	62.5	40.0	7.5	15.0
Private, nonprofit	163	60.7	37.4	8.6	14.7
Private, proprietary	60	75.0	50.0	1.7	23.3
Type of delivery	412§	69.9	34.2	14.8	20.9
Cesarean section	111	61.2	39.6	5.4	16.2
Not cesarean section	301	73.1	32.2	18.3	22.6
Cause of death	551	68.1	30.0	19.4	18.7
All deaths from obstetric causes	356	80.0	34.5	25.0	20.5
Abortion (includes spontaneous)	109	96.4	9.2	63.3	23.9
Other obstetric causes	247	72.9	45.8	8.1	19.0
Sepsis	52	63.4	44.2	9.6	9.6
Hemorrhage	39	74.4	56.4	7.7	10.3
Toxemia	35	79.9	31.4	11.4	37.1
Ectopic pregnancy	28	89.3	64.3	14.3	10.7
Other complications and causes	93	69.9	41.9	4.3	23.7
All deaths from non-obstetric causes	195	46.7	22.1	9.2	15.4

*So stated on death certificate, or women whose birthplace or parents' birthplace was Mexico.
†Includes federal hospitals.
‡Excludes unknowns and, for "source of prenatal care," women with no prenatal care.
§Excludes women not delivered and, for "hospital of delivery," those not delivered in a hospital or for whom type of hospital was not reported.

natal care, but who died of causes arising after prenatal care began. Some committees considered such late prenatal care as a patient factor, while other committees decided that since late care did not contribute to death there was no avoidable patient factor.

Of every ten deaths reviewed committees found: Three with professional or hospital factors only; two with professional or hospital factors *and* patient factors; two with patient factors only; and three with no factor or deaths for which it could not be determined if a factor existed.

Table 5 shows types of avoidable factors identified for groups of women who were studied. In addition to women who died from abortion or who had neglected prenatal care, other groups of mothers also had relatively high proportions of patient, professional or hospital factors: Mexican-Americans; women with four or more previous live births; women who died of ectopic pregnancy; women who died of toxemia; women delivered in county hospitals; women delivered in private proprietary hospitals.

SUMMARY

During the period 1957-1962, the Committee on Maternal and Child Care of the California Medical Association and the State Department of Public Health studied 552 deaths of women during or within 90 days of termination of pregnancy. Seven

out of ten deaths were from obstetric causes, including 109 from abortion. Of the 195 deaths from non-obstetric causes, about one-half were considered by review committees to have been related to pregnancy.

About one-third of all obstetric deaths resulted from abortion; 78.0 per cent of the 109 abortion deaths followed induced abortion. Compared with live births occurring in the population, abortion deaths were found more frequently among non-whites and women with several children. Two-thirds of the women were married.

Of the 247 women who died of obstetric causes other than abortion, two-thirds carried their pregnancies to at least 37 weeks before delivery or death; almost all (84.6 per cent) delivered. Three out of ten deliveries were by cesarean section. Two-thirds of the deliveries were live births.

The most frequent causes of non-obstetric death were accidents (including 16 deaths resulting from medical procedures), circulatory and respiratory disease. Compared with women who died of obstetric causes, in non-obstetric deaths pregnancy was more often terminated by delivery or death before term.

Any avoidable factors which contributed to maternal deaths were identified. Professional errors in judgment (44.8 per cent of all deaths), inadequate prenatal care by the patient (18.0 per cent) and induced abortion (17.2 per cent) were the factors most often found.

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